DRAFT

Health Risk Assessment
San Diego & Imperial Valley Railroad
San Diego Yard
Impact to Ballpark Village Project

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Introduction

The purpose of this health risk assessment is to determine the impact of locomotive operations at the San Diego & Imperial Valley (SDIV) San Diego Yard upon the Ballpark Village residential project. This development could include over 1000 units which would be immediately adjacent to the freight yard. Of most concern is the impact of diesel particulate matter (diesel PM) upon the residents. This health risk assessment will determine the estimated impact of these operations on those residents.

The methodology used in this assessment is still new. Diesel PM was recognized as a toxic only recently (1998). The primary goal of this analysis is to determine if the co-location of the yard and the residential project pose any significant risks that could require further detailed analysis.

All evaluations were done using the Hotspots Analysis Reporting Program (HARP) software which is available in the public domain. This assessment was conducted using the guidelines provided by the California Office of Environmental Health hazard Assessment (OEHHA) for the Air Toxics Hot Spots Program, and the guidelines developed by the San Diego Air Pollution Control District for air toxics “hot spots”.

Diesel Emissions and Rail Yards

The following are strategies from the CARB Air Quality and Land Use Handbook in regard to rail yards:

For facilities like rail yards and ports, the potential impact area is so large that the real solution is to substantially reduce facility emissions. However, land use planners can avoid encroaching upon existing rail facilities and those scheduled for expansion. We also recommend that while air agencies tackle this problem, land use planners try not to add new sensitive individuals into the highest exposure areas. Finally, we recommend that land use agencies consider the potential health impacts of rail yards in their planning and permitting processes. Additional limitations and mitigation may be feasible to further reduce exposure on a site-specific basis.

The specific recommendations are as follows:

Avoid siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard.

Within one mile of a rail yard, consider possible siting limitations and mitigation approaches.

This recommendation has validity for major rail yards. But due to the limited time of operations (6 hours maximum per day) and the small number of locomotives operating in the SDIV San Diego yard (three maximum), this may not apply. By comparing the emissions thresholds set by CARB to the existing emissions produced by these locomotives, there is a possibility that the existing switching operations may be permissible. There is no associated intermodal yard at this facility which further reduces the emissions footprint.

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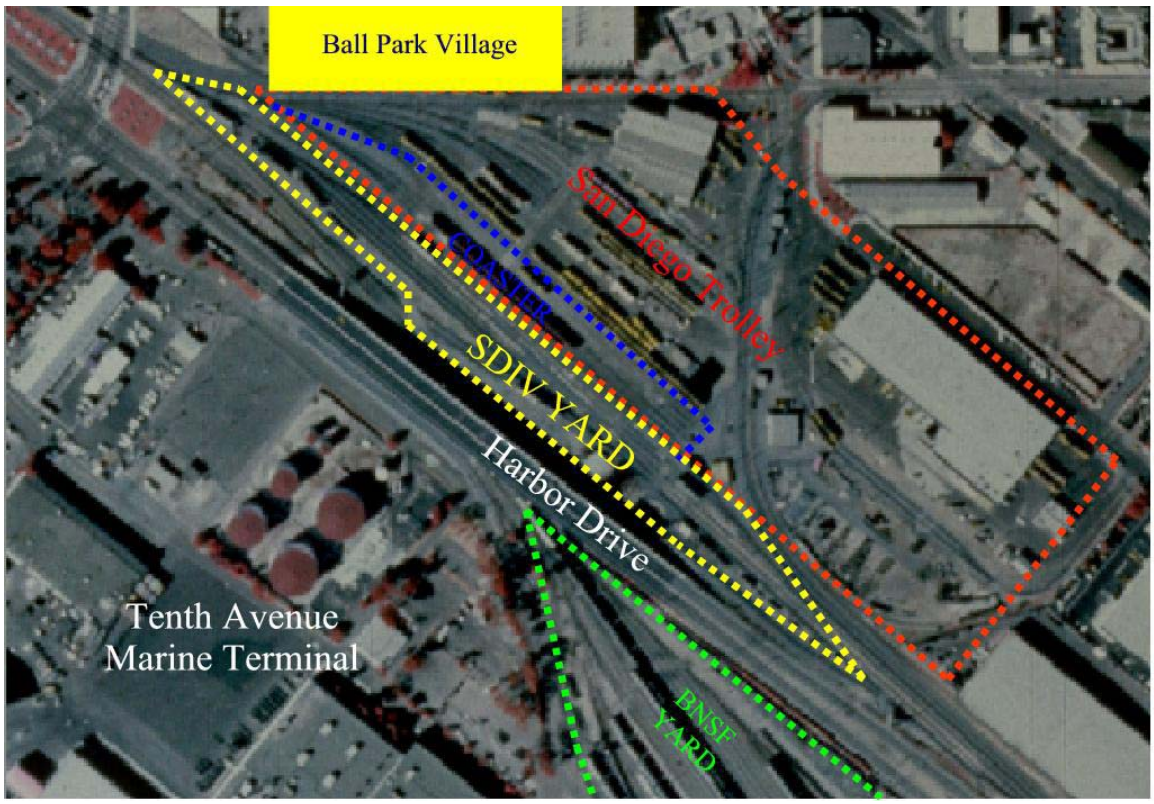
Rail Facilities



There are three "heavy rail" facilities and one light rail facility located in the immediate area. The Burlington Northern Santa Fe (BNSF) San Diego yard is located south of the Ball Park Village site across Harbor Drive.

The San Diego Trolley has maintenance facilities located directly southeast of the Ball Park Village site. All of the trolley vehicles are elective. The North County Transit District (NTCD) stores three of its diesel powered COASTER train sets at the south west end of this facility.

The San Diego & Imperial Valley Railroad operates a yard to the southeast of the Trolley maintenance facility.

Operations

SDIV conducts joint operations with the San Diego Trolley on the Blue Line (south Line) and the Orange Line (east line). Because the Federal Railroad Administration prohibits heavy freight locomotives and light rail vehicle from operating on the same track at the same time, temporal separation is required. As a result, SDIV can only operate on these tracks between approximately 1:30 AM and 4:00 AM. This makes this requirement makes this operation an overnight railroad, with the associated late night noise and emissions.

Through Trains

SDIV operates a round trip 5 days per week between the San Diego yard and San Ysidro yard. The trains operate within a limited window on the Trolley Blue Line between 1:00 AM and 4:05 AM. These trains average 33 cars in length, for a total of 2270 ft.

SDIV also operates two round trips per week to El Cajon. These trains average 5 cars in length.

Switching

SDIV switches the San Diego yard and BNSF interchange by running as far north as 5th St. The San Diego crew begins operations in the yard at approximately 9:00 PM. The crew will take carloads from the BNSF yard and move them to the San Diego yard. The southbound train will be made up at his yard. These switching operations can take up to 3 hours. When the southbound train is complete, it will move south to San Ysidro after the Trolley operations are discontinued.

At approximately 4:00 AM, the northbound train arrives at the San Diego yard. This crew moves the cars it has to the BNSF San Diego yard. This operation can take up to 90 minutes, or until 5:30 AM.

The twice weekly train for El Cajon is also assembled at the San Diego yard. This train will depart as soon as the Trolley operations discontinue. The returning train will deliver its cars to the yard at around 4:00 AM

Emissions Inventory

A detailed assessment was conducted to determine locomotive operations in the SDIV San Diego yard.

Two sources were used to determine the emissions inventories. They were EPA reference documents *Procedures for Emission Inventory Preparation; Volume IV: Mobile Sources, EPA420-R-92-009,* and *Technical Highlights; Emission Factors for Locomotives, EPA420-F-97-051*

Total locomotive operating hours per year were determined to be approximately 2300. A 10.43 gallon per hour fuel consumption rate was used based upon the GP 38 locomotive switch cycle operating characteristics, and fuel consumption data for each throttle setting.

The following information and tables calculate the emissions associated with locomotive operations and the SDIV San Diego Yard.

Annual Locomotive Hours per Year in San Diego Yard:

South Bound Train
3.5 switching hours per night 5 nights per week
2 locomotives per train
35 locomotive hours per week
1820 locomotive hours per year

North Bound Train
1 switching hour per night 5 nights per week
2 locomotives per train
10 locomotive hours per week
520 locomotive hours per year

El Cajon Train
1 switching hours per night 2 nights per week
1 Locomotive per train
2 locomotive hours per week
104 locomotive hours per year

2444 Locomotive Hours
Less 150 Hours per year for Holidays and Ball Park events

2300 Total Annual Locomotive Hours

The detailed operational data were used to establish an annual emissions level. The GP-38 is the standard locomotive used on the SDIV. The operational characteristics in terms of emissions were used to establish emissions criteria and further dispersion data. The detailed information for this locomotive was provided in the CARB Roseville yard study.

Unlike fixed industrial power sources which have constant parameters, locomotives have different discreet power settings. To accommodate his factor, each locomotive power setting was evaluated separately. Each locomotive setting was used to establish a 'stack" wit unique characteristics to evaluate the overall impact of diesel PM in the area of the SDIV San Diego Yard, and specifically to Ballpark Village.

Using EPA studies, table established the emissions per gallon for a GP-38 locomotive

Locomotive Emission Factors: lbs. per gallon

Description	CO (lbs./gal)	VOC (lbs./gal)	NOx (lbs./gal)	PM10 (lbs./gal)
GP-38 Switch Duty Cycle	0.0707	0.0308	0.5243	0.0136

Further evaluations were conducted using the date which established the amount of time a GP-38 locomotive in switch service was operated at each throttle notch setting. This information was then used to establish the emissions produced at each throttle notch setting, and the total emissions produced.

GP 38 Switch Duty Cycle									
Throttle Setting (Notch)	Idle	1	2	3	4	5	6	7	8
% Time in Notch	77%	7%	7%	4%	2%	1%	0.5%	0.5%	1%
Fuel Consumption per Hour at Notch (gal)	5	7	16	31	47	64	83	103	122
Fuel Fraction at Notch (gal.)	3.85	0.49	1.12	1.24	0.94	0.64	0.42	0.52	1.22
Lbs PM/hr	0.052	0.007	0.015	0.017	0.013	0.009	0.006	0.007	0.017
Lbs PM/yr	120.43	15.33	35.03	38.79	29.40	20.02	12.98	16.11	38.16
Total PM lbs/yr	**326.25**								

Each throttle setting was evaluated as an individual 'stack". This was due to the different exhaust temperatures and flow rates an each throttle notch.

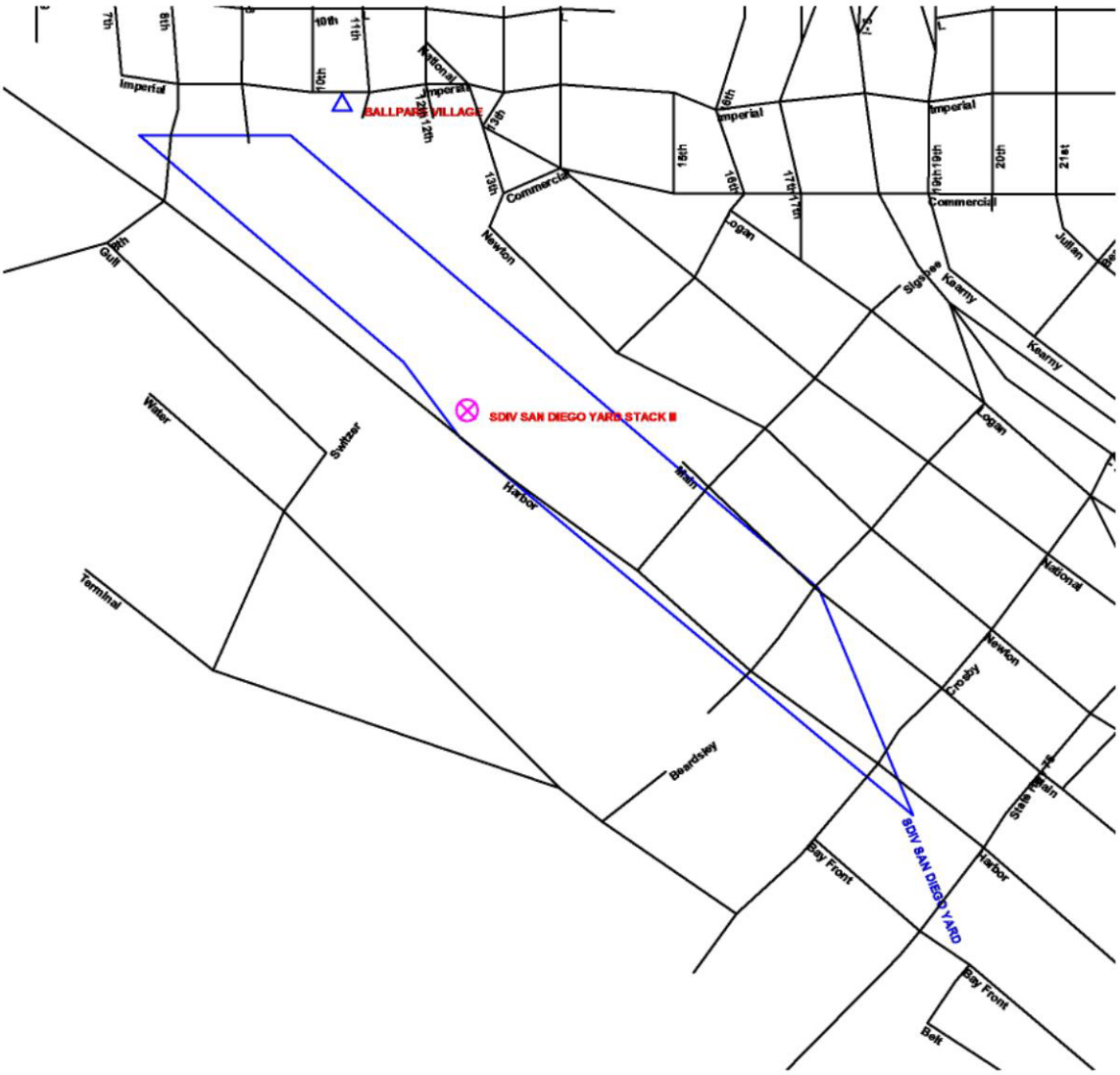
Dispersion Analysis

The tables below show the ground level concentrations (GLC) of diesel particulate matter in micrograms per cubic meter. The levels were evaluated for both the background concentrations, and the additional emissions from the SDIV San Diego Yard.

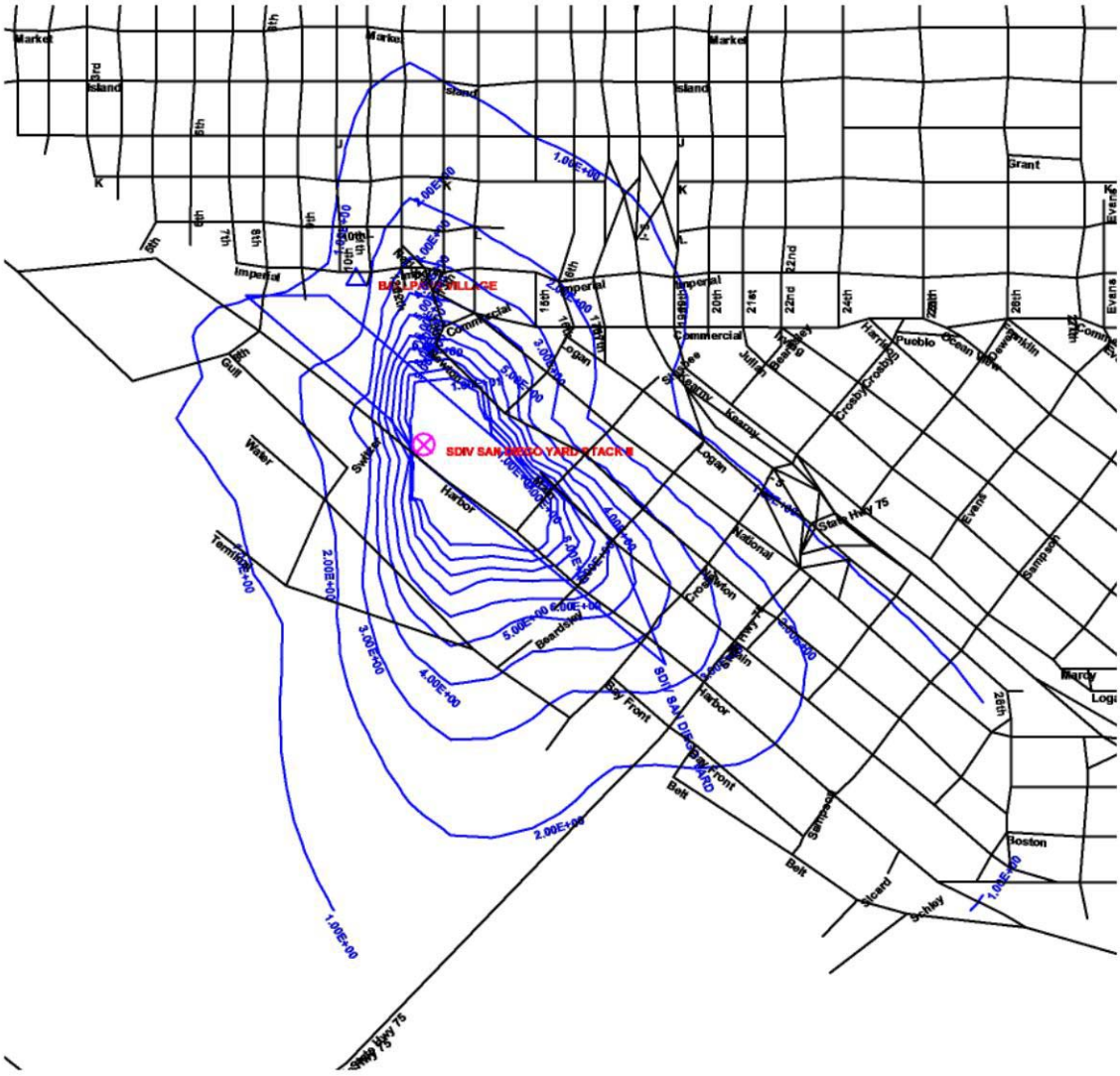
Ground Level Concentrations	
Diesel Particulate Matter from SDIV SD Yard	
Ball Park Village Site	
	CAS 9901
	ug/m^3
1 hr	2.78E+00
4 hr	8.70E-01
6 hr	6.28E-01
7 hr	5.64E-01
30 day	6.81E-03
Avg.	3.62E-03

Ground Level Concentrations	
Diesel Particulate Matter from All Sources	
Ball Park Village Site	
	CAS 9901
	ug/m^3
1 hr	1.38E+01
4 hr	1.19E+01
6 hr	1.16E+01
7 hr	1.16E+01
30 day	1.10E+01
Avg.	1.10E+01

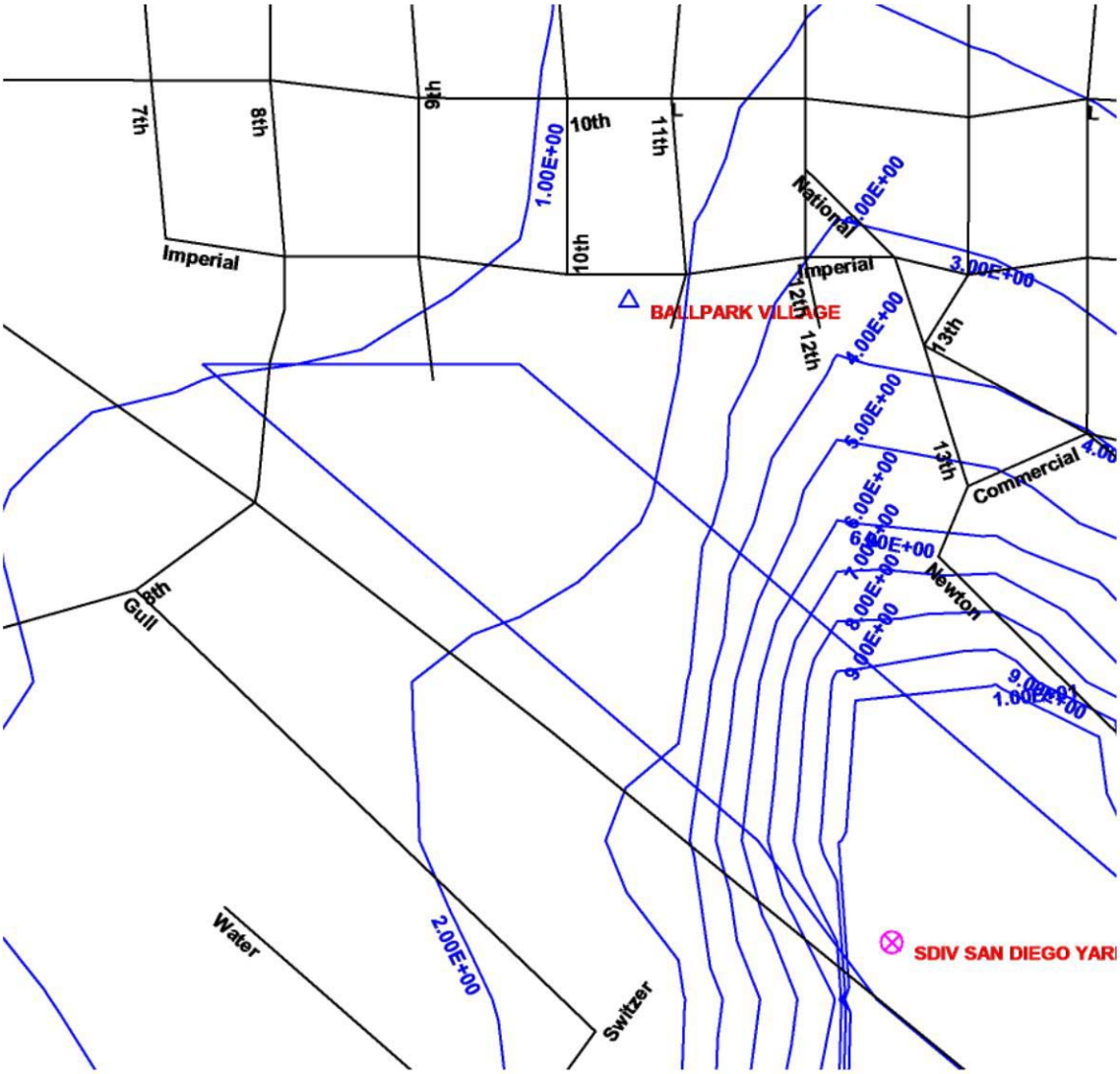
The area evaluated for dispersion analysis was the area of San Diego immediately adjacent to the SDIV San Diego Yard. The scope of the analysis area is shown below.



Cancer risk in terms of cases per million related to emissions from the yard are shown by the isopeths in the diagram below:



The detailed isopeths for Ballpark Village are shown below.



Risk Analysis

The table below identifies the additional cancer cases per 1 million based upon the simulations run using the HARP software.

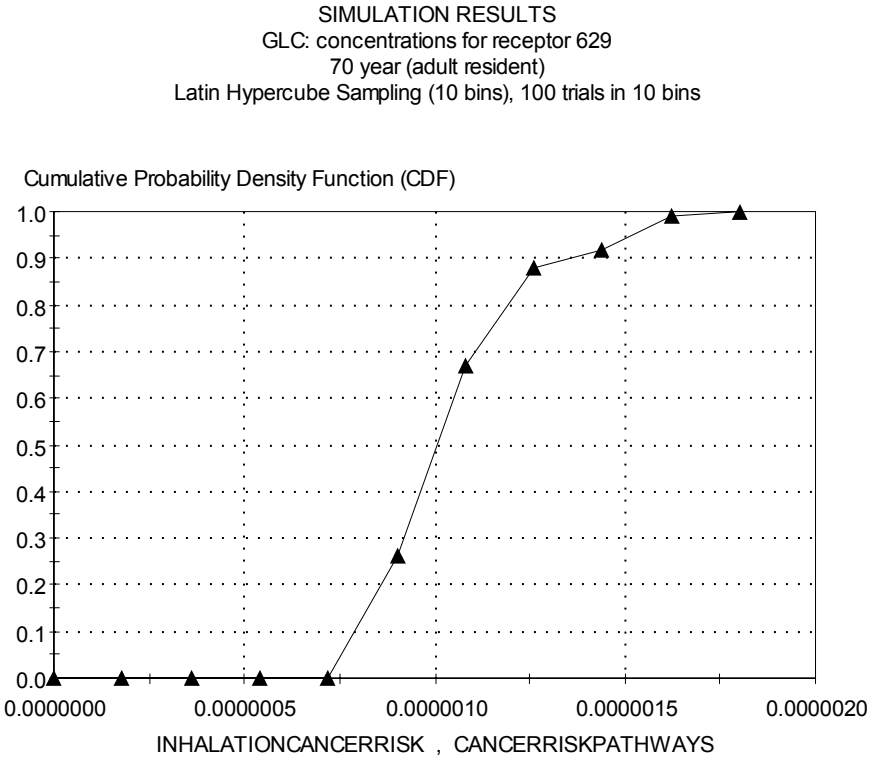
While an independent analysis of the impact of the freight rail yard was conducted, those results were also compared to the background concentration of diesel PM in downtown San Diego. The background level of diesel PM used for this assessment was 1.0 ug/m3.

	SDIV Yard	All Sources
70 yr	1.5	416
30 yr	0.6	178
9 yr	0.2	54

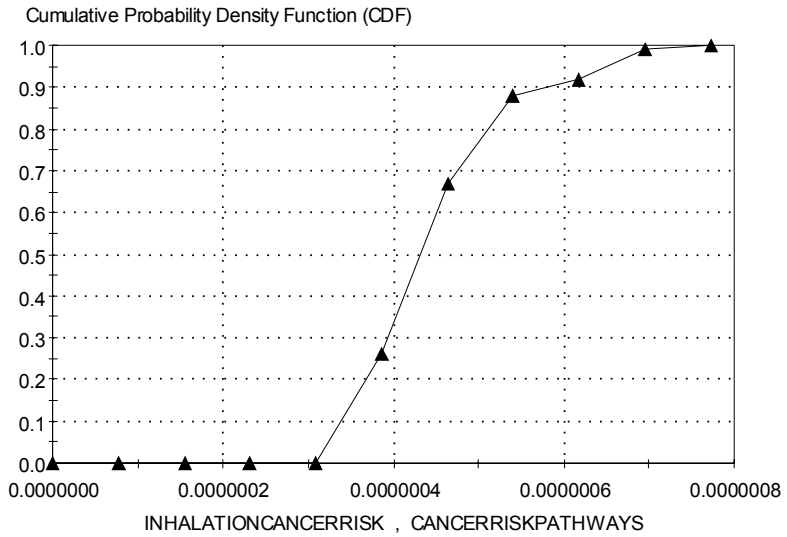
The table above shows that the impact of the SDIV San Diego Yard to Ballpark Village in terms of the diesel PM cancer risk is insignificant in terms of the already present diesel PM levels.

Cancer Risk Assessment

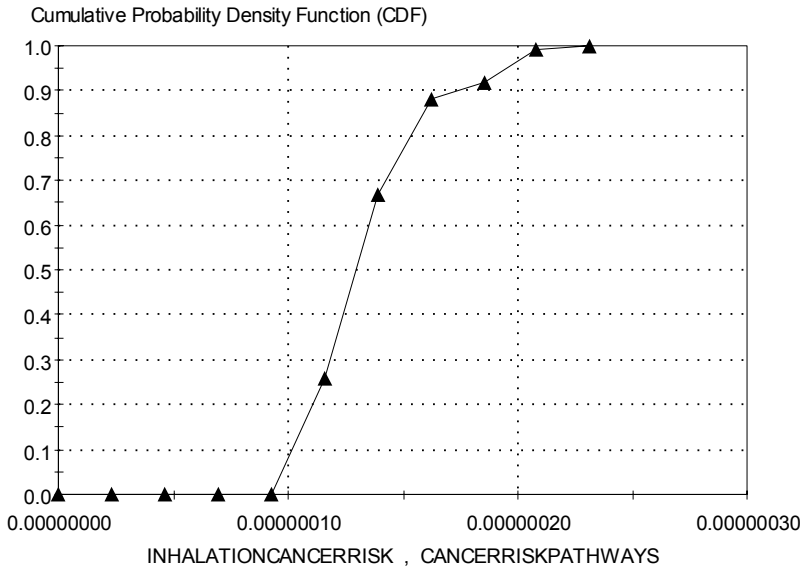
The following three tables below shows the cancer risk in cases per million for Ballpark Village from the SDIV San Diego Yard. The 70 year evaluation is the standard, but this analysis was conducted using the 70 year, 30 year, and 9 year adult calculations.



SIMULATION RESULTS
GLC: concentrations for receptor 629
30 year (adult resident)
Latin Hypercube Sampling (10 bins), 100 trials in 10 bins

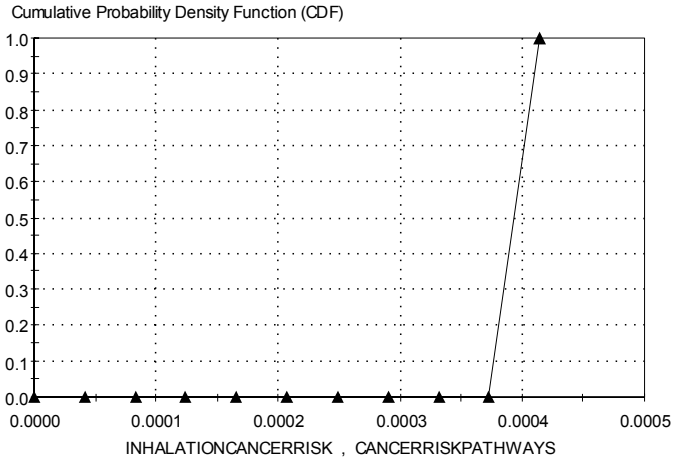


SIMULATION RESULTS
GLC: concentrations for receptor 629
Latin Hypercube Sampling (10 bins), 100 trials in 10 bins

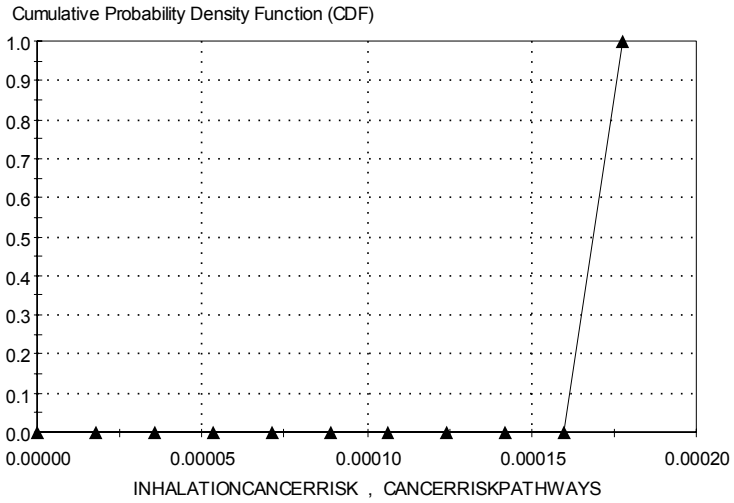


The following three tables below shows the cancer risk in cases per million for Ballpark Village from the background diesel PM emissions including the SDIV San Diego Yard.

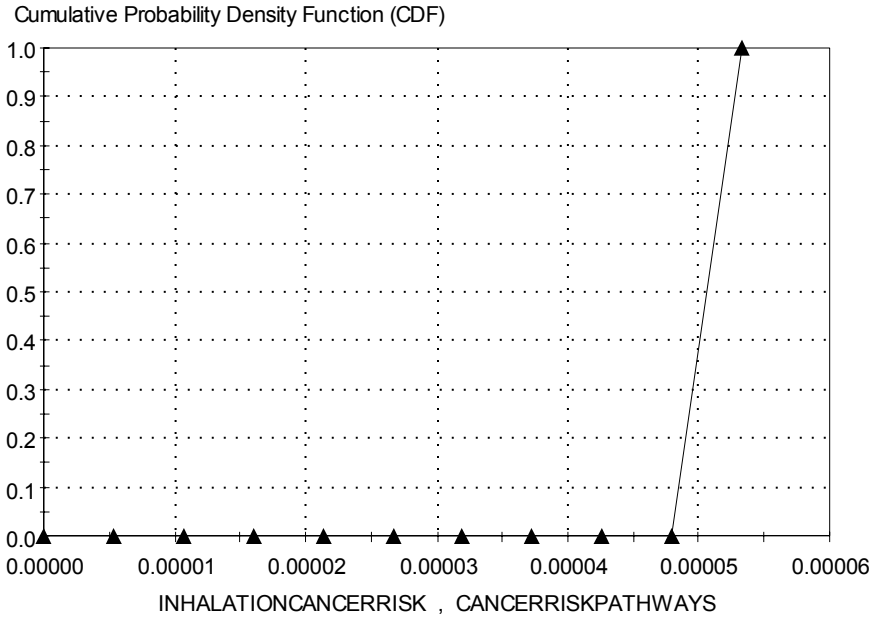
SIMULATION RESULTS
GLC: Target GLCs set to unit values by HARP
70 year (adult resident)
Latin Hypercube Sampling (10 bins), 1 trials in 10 bins



SIMULATION RESULTS
GLC: Target GLCs set to unit values by HARP
30 year (adult resident)
Latin Hypercube Sampling (10 bins), 1 trials in 10 bins



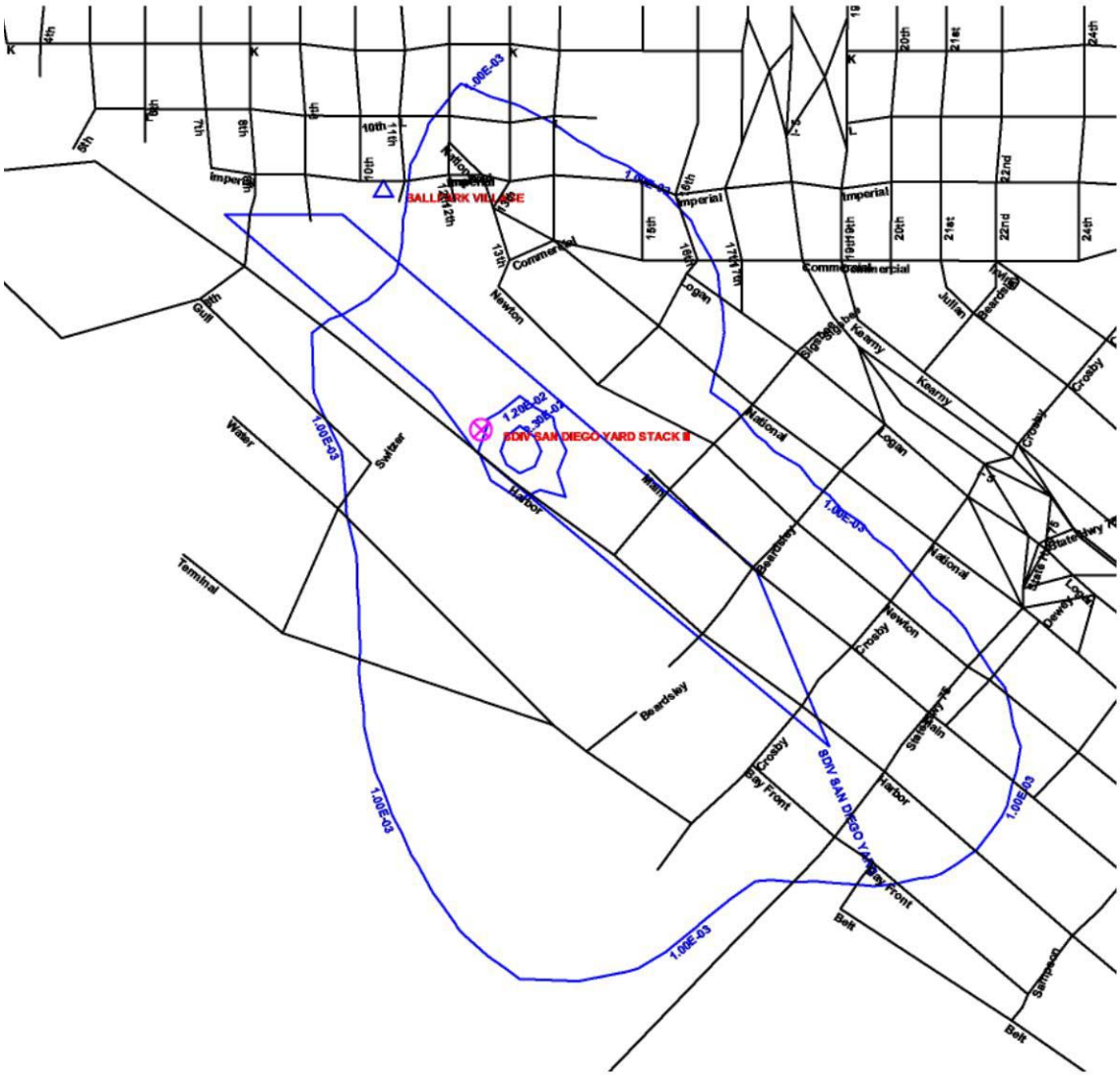
SIMULATION RESULTS
GLC: Target GLCs set to unit values by HARP
Latin Hypercube Sampling (10 bins), 1 trials in 10 bins



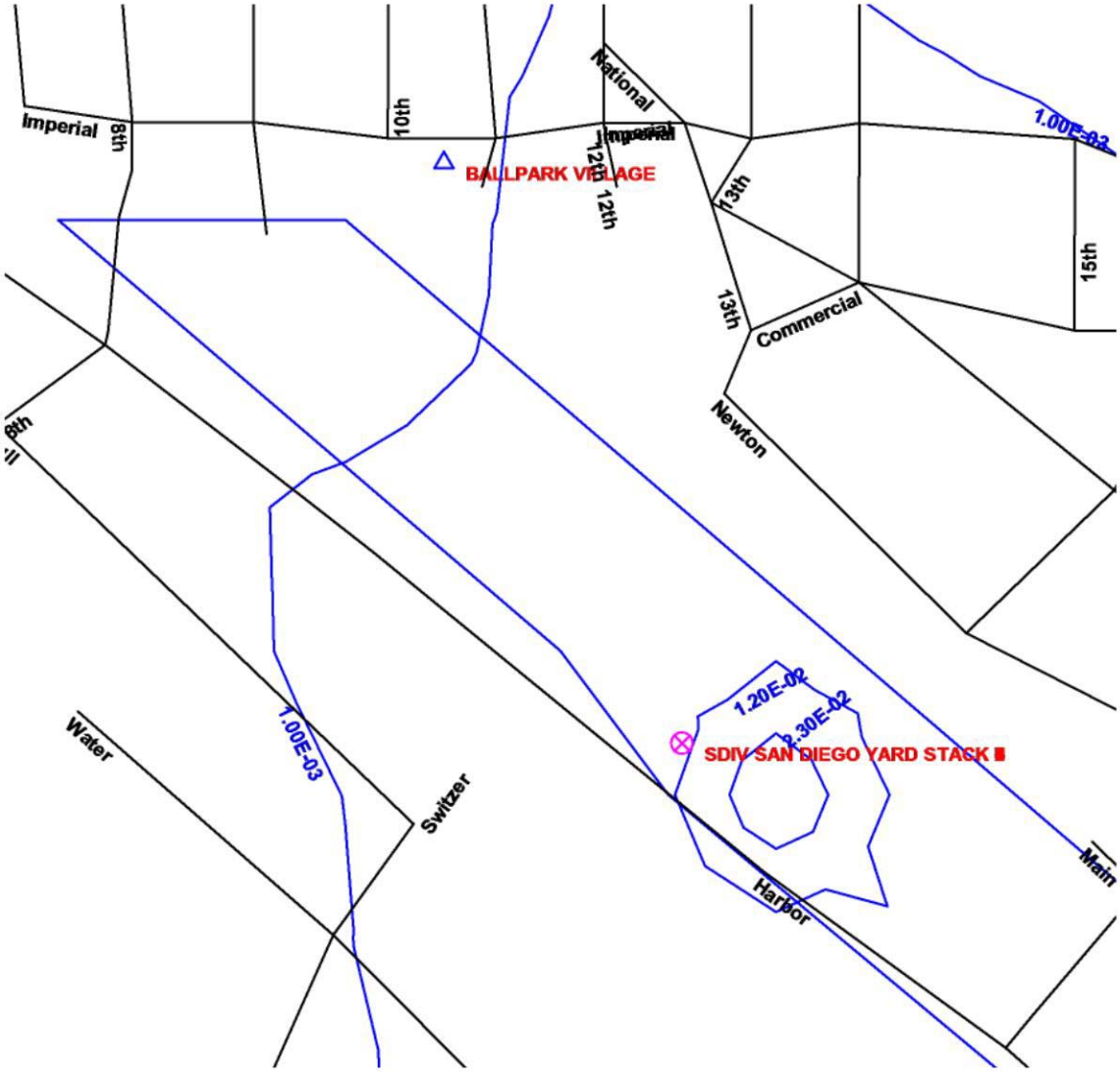
Non-Cancer Chronic Risk Assessment

The chronic health impact of inhalation of diesel PM is calculated to be 724 per million (7.24 E-04) for the immediate area of Ballpark Village.

The isopeths for non-cancer chronic health impact for the entire area surrounding the yard below:



This set of isopeths shows the area surrounding Ballpark Village in detail:



Conclusion

The impact of diesel PM emissions form the SDIV San Ysidro Yard appears to be minimal to the Ballpark village project. Advanced design features and proper placement of air intakes can further reduce this risk.

Additional analysis may be warranted for this project if any substantial changes occur in terms of design and location.

Bibliography

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South Coast Air Quality Management District, *Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis*., Diamond Bar, CA, South Coast Air Quality Management District, 2003

APPENIDX A

DETEAILED EMISSONS DATA

08/06/05 AIR TOXIS EMISSIONS DATA SYSTEM
FAC-Chemicals: User Defined Chemical List SUMMARY FOR YEAR 2005

USER DEFINED FACILITY SUMMARY - Chemicals: User Defined Chemical List
FACILITY LIST

CO	ZONE	FACILITY	NAME	FSIC	EMISSIONS (LBS/YR) [SEE NOTES 1,2, & 3]
AB	UTME	ADDRESS			
DIS	UTMN	CITY	ZIP	Diesel engi	
37	11	11112	SDIV SAN DIEGO YARD	4013	326.250
SD	485.80030	1501 NATIONAL AVE			
SD	3618.4001	SAN DIEGO	92113		

SUBTOTAL COUNTY 37 326.250

GRAND TOTALS: USER DEFINED FACILITIES LIST 326.250

08/06/05 AIR TOXIS EMISSIONS DATA SYSTEM
SUMMARY FOR INVENTORY YEAR 2005

PROCESS SUMMARY

User-specified facility list from file: C:\HARP\SDIV.fac

(NOTE 1: emissions in LBS/YR for toxics, TONS/YR for criteria pollutants, CURRIES/YR for radionuclides)

FACILITY FACILITY NAME & ADDRESS
--- ---
DEVICE SCC SCC NAME 1 SIC SIC DESCRIPTION
--- --- --- --- ---
SCC NAME 3 PRCESS DESC (REPORTED BY FAC)
--- --- EMISSIONS (NOTE 1)
SCC NAME 6 PROCESS UNITS (DITTO) ---
--- ---
SCC NAME 8 CONF. PROCESS RATE DieselExhP
--- --- --- ---

11112 SDIV SAN DIEGO YARD 1501 NATIONAL AVE SAN DIEGO 92113
1 28888803 INTERNLCOMBUSTION 4013 SWITCHNG,TERMINL ESTA 120.430
FUGITIVE EMISSION IDLE
NOT CLASSIFIED 1000 HORSEPOWER-HOURS
OTHER

1 28888803 INTERNLCOMBUSTION 4013 SWITCHNG,TERMINL ESTA 15.330
FUGITIVE EMISSION NOTCH 1
NOT CLASSIFIED 1000 HORSEPOWER-HOURS
OTHER

1 28888803 INTERNLCOMBUSTION 4013 SWITCHNG,TERMINL ESTA 35.030
FUGITIVE EMISSION NOTCH 2
NOT CLASSIFIED 1000 HORSEPOWER-HOURS
OTHER

1 28888803 INTERNLCOMBUSTION 4013 SWITCHNG,TERMINL ESTA 38.790

FUGITIVE EMISSION NOTCH 3
NOT CLASSIFIED 1000 HORSEPOWER-HOURS
OTHER

1 28888803 INTERNLCOMBUSTION 4013 SWITCHNG,TERMINL ESTA 29.400
FUGITIVE EMISSION NOTCH 4
NOT CLASSIFIED 1000 HORSEPOWER-HOURS
OTHER

1 28888803 INTERNLCOMBUSTION 4013 SWITCHNG,TERMINL ESTA 20.020
FUGITIVE EMISSION NOTCH 5
NOT CLASSIFIED 1000 HORSEPOWER-HOURS
OTHER

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NOT CLASSIFIED 1000 HORSEPOWER-HOURS
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FUGITIVE EMISSION NOTCH 7
NOT CLASSIFIED 1000 HORSEPOWER-HOURS
OTHER

1 28888803 INTERNLCOMBUSTION 4013 SWITCHNG,TERMINL ESTA 38.160
FUGITIVE EMISSION NOTCH 8
NOT CLASSIFIED 1000 HORSEPOWER-HOURS
OTHER

SUBTOTAL FACIL 11112 326.250

GRAND TOTAL 326.250

DRAFT

APPENIDX B

DETEAILED RISK ASSESSMENT DATA

70 YEAR CANCER

70 YEAR CHRONIC HEALTH IMPACT

BALLPARK VILLAGE

This file: C:\HARP\PROJECTS\HRA_SD\Rep_Can_70yr_DerOEH_Rec629_AllSrc_AllCh_ByRec_ByChem_Site_UTM.txt

Created by HARP Risk Module Version: 21.7.30
Creation date: 8/7/2005 10:29:44 AM

EXCEPTION REPORT
(there have been no changes or exceptions)

INPUT FILES:
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Averaging period adjustment factors file: not applicable
Emission rates file: database
Site parameters file: C:\HARP\PROJECTS\HRA_SD\SDIV.sit

Screening mode is OFF

Exposure duration: 70 year (adult resident)
Analysis method: Derived (OEHHA) Method
Health effect: Cancer Risk
Receptor(s): BALLPARK VILLAGE
Sources(s): All
Chemicals(s): All

SITE PARAMETERS

DEPOSITION

Deposition rate (m/s) 0.05

DRINKING WATER

*** Pathway disabled ***

FISH

*** Pathway disabled ***

PASTURE

*** Pathway disabled ***

HOME GROWN PRODUCE

*** Pathway disabled ***

PIGS, CHICKENS AND EGGS

*** Pathway disabled ***

DERMAL ABSORPTION

*** Pathway disabled ***

SOIL INGESTION

*** Pathway disabled ***

MOTHER'S MILK

*** Pathway disabled ***

CHEMICAL CROSS-REFERENCE TABLE AND BACKGROUND CONCENTRATIONS

CHEM	CAS	ABBREVIATION	POLLUTANT NAME	BACKGROUND (ug/m^3)
0001	9901	DieselExhPM	Diesel engine exhaust, particulate matter	0.000E+00

CANCER RISK REPORT

DOMINANT PATHWAYS, Receptor BALLPARK VILLAGE

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	YES	-	-	-	-	-	-	-	-	-	-	-

DERIVED CANCER RISK, RECEPTOR BALLPARK VILLAGE

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG	MEAT	ORAL	TOTAL	UTME	UTMN
0001	1.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-06	
SUM	1.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-06	

485469 3618740

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Created by HARP Risk Module Version: 21.7.30
Creation date: 8/7/2005 11:20:26 AM

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(there have been no changes or exceptions)

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Averaging period adjustment factors file: not applicable
Emission rates file: database
Site parameters file: C:\HARP\PROJECTS\HRA_SD\SDIV.sit

Screening mode is OFF

Exposure duration: resident
Analysis method: Derived (OEHHA) Method
Health effect: Chronic HI
Receptor(s): BALLPARK VILLAGE
Sources(s): All
Chemicals(s): All

SITE PARAMETERS

DEPOSITION

Deposition rate (m/s) 0.05

DRINKING WATER

*** Pathway disabled ***

FISH

*** Pathway disabled ***

PASTURE

*** Pathway disabled ***

HOME GROWN PRODUCE

*** Pathway disabled ***

PIGS, CHICKENS AND EGGS

*** Pathway disabled ***

DERMAL ABSORPTION

*** Pathway disabled ***

SOIL INGESTION

*** Pathway disabled ***

MOTHER'S MILK

*** Pathway disabled ***

CHEMICAL CROSS-REFERENCE TABLE AND BACKGROUND CONCENTRATIONS

CHEM	CAS	ABBREVIATION	POLLUTANT NAME	BACKGROUND (ug/m^3)
0001	9901	DieselExhPM	Diesel engine exhaust, particulate matter	0.000E+00

CHRONIC HI REPORT

DOMINANT PATHWAYS, Receptor BALLPARK VILLAGE

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	YES	-	-	-	-	-	-	-	-	-	-	-

DERIVED CHRONIC HI, RECEPTOR BALLPARK VILLAGE

CHEM	CV	CNS	BONE	DEVEL	ENDO	EYE	GILV	IMMUN	KIDN	REPRO	RESP	SKIN	BLOOD	MAX	UTME	UTMN
0001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.24E-04	0.00E+00	0.00E+00	7.24E-04	
SUM	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.24E-04	0.00E+00	0.00E+00	7.24E-04	

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